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THE EFFECTS OF ATMOSPHERIC WATER VAPOR ON INFRARED  
PROPAGATION(U) OHIO STATE UNIV COLUMBUS ELECTROSCIENCE  
LAB R K LONG ET AL. SEP 84 ESL-713774-5 ARO-17603.2-65  
DAAG29-81-K-0084

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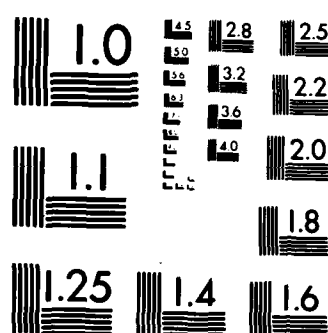
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The Ohio State University

THE EFFECTS OF ATMOSPHERIC WATER VAPOR ON  
INFRARED PROPAGATION

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September 1984

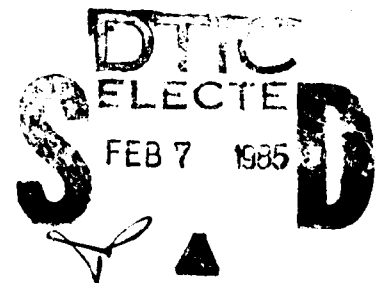
Final Report 713774-5

Contract DAAG29-81-K-0084

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The goal of this project was to obtain experimental water vapor absorption data using a long path absorption cell. One experiment used a frequency doubled CO<sub>2</sub> laser source to obtain data at specific frequencies near 5.3  $\mu$ m. The second experiment collected high resolution (.06/cm<sup>-1</sup>) Fourier transform spectra over the 500-5000/cm<sup>-1</sup> band for pure and nitrogen broadened samples. It was planned to use these data to improve the far-wing line shape model, first proposed by Nordstrom and Thomas [5].

The FTS spectra were completed and analyzed. They are submitted in two volumes as Reports 713774-3 [3] and 713774-4 [4] with the same issue date as this report.

The laser transmittance experiments were less successful. They were described in Report 713774-2 [2]. As explained in the conclusion of this report, the data had too much uncertainty to permit analysis in terms of line shape variations. The data is useful however, for those interested in transmittance in the 5  $\mu$ m band.

A list of the reports produced during this study are given in the references [1-4].

Finally, we would like to call attention to a recent report [6] which has presented a comparison of 8-12  $\mu$ m water continuum measurements. It includes some comments concerning the Ohio State University work.



## REFERENCES

- [1] Long, R.K. and E.K. Damon, "The Effects of Atmospheric Water Vapor on Infrared Propagation", Technical Report 713774-1, January 1982, The Ohio State University ElectroScience Laboratory, Department of Electrical Engineering; prepared under Contract # DAAG29-81-K-0084 for the Department of the Army, U.S. Army Research Office, Research Triangle Park, North Carolina.
- [2] Walter, L.G., "The Effects of Atmospheric Water Vapor Absorption on Infrared Laser Propagation in the 5 Micrometer Band", Technical Report 713774-2, May 1983, The Ohio State University ElectroScience Laboratory, Department of Electrical Engineering; prepared under Contract # DAAG29-81-K-0084 for the Department of the Army, U.S. Army Research Office, Research Triangle Park, North Carolina.
- [3] Long, R.K. and E.K. Damon, "An Atlas of Pure Water Vapor Spectra from 500 to 5000  $\text{cm}^{-1}$ ", Technical Report 713774-3, September 1984, The Ohio State University ElectroScience Laboratory, Department of Electrical Engineering; prepared under Contract # DAAG29-81-K-0084 for the Department of the Army, U.S. Army Research Office, Research Triangle Park, North Carolina.
- [4] Long, R.K. and E.K. Damon, "An Atlas of Nitrogen-Broadened Water Vapor Spectra from 500 to 5000  $\text{cm}^{-1}$ ", Technical Report 713774-4, September 1984, The Ohio State University ElectroScience Laboratory, Department of Electrical Engineering; prepared under Contract # DAAG29-81-K-0084 for the Department of the Army, U.S. Army Research Office, Research Triangle Park, North Carolina.
- [5] Thomas, M.E., "Tropospheric Water Vapor Absorption in the Infrared Window Regions", Technical Report 784701-5, August 1979, The Ohio State University ElectroScience Laboratory, Department of Electrical Engineering; prepared under Contract # DAAG29-77-C-0010 for the Department of the Army, U.S. Army Research Office, Research Triangle Park, North Carolina.
- [6] Loper, G.L., M.A. O'Neill and J.A. Gelbwachs, "Below-Room-Temperature Water-Vapor Continuum Absorption Within the 8- to 12- $\mu\text{m}$  Atmospheric Transmission Window", Report SD-TR-84-14, Aerospace Corporation, May 1984.

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